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Comparative assessment of offshore wind foundations presentation

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Comparative assessment of offshore wind foundations



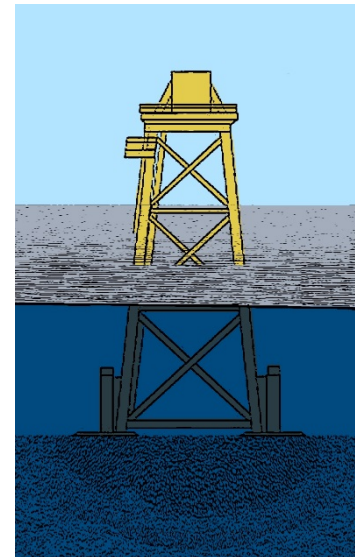
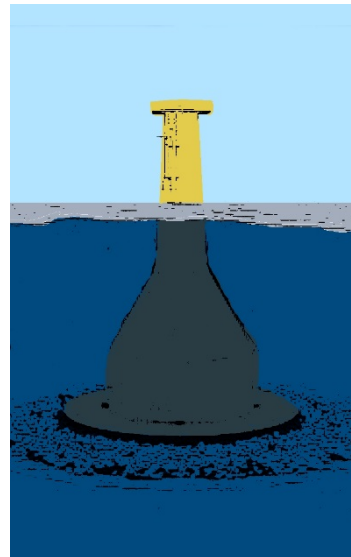
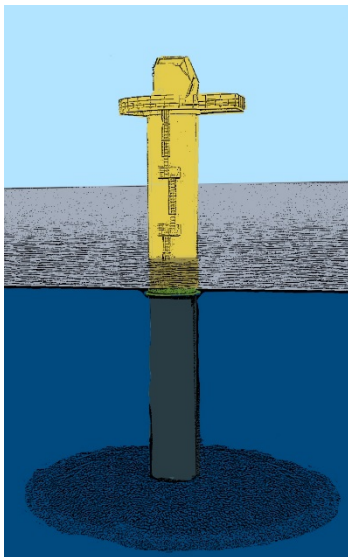
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The research leading to these results has
received funding from the European
Union Seventh Framework Programme
under the agreement SCP2-GA-2013-
614020.



- Life cycle impacts to be considered for several LEANWIND innovations, including:
 - foundation design
 - vessel design
 - novel O&M methods
- Initial analysis focusses on a foundation design

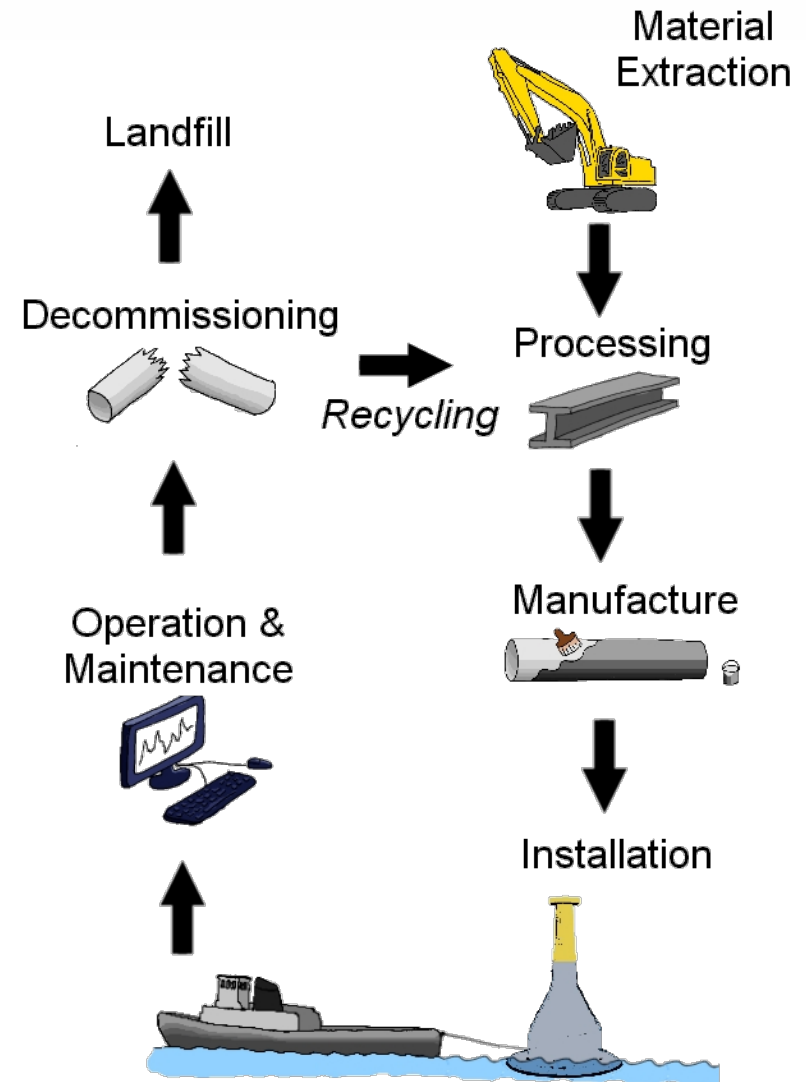


	Location	Water depth	Distance to port	Foundation type
Site 1	~ West Gabbard	35m	30km	Gravity Base
				XL Monopile
Site 2	~ Moray Firth	50m	100km	Gravity Base
				Jacket
Rest of life cycle consistent with foundation type				

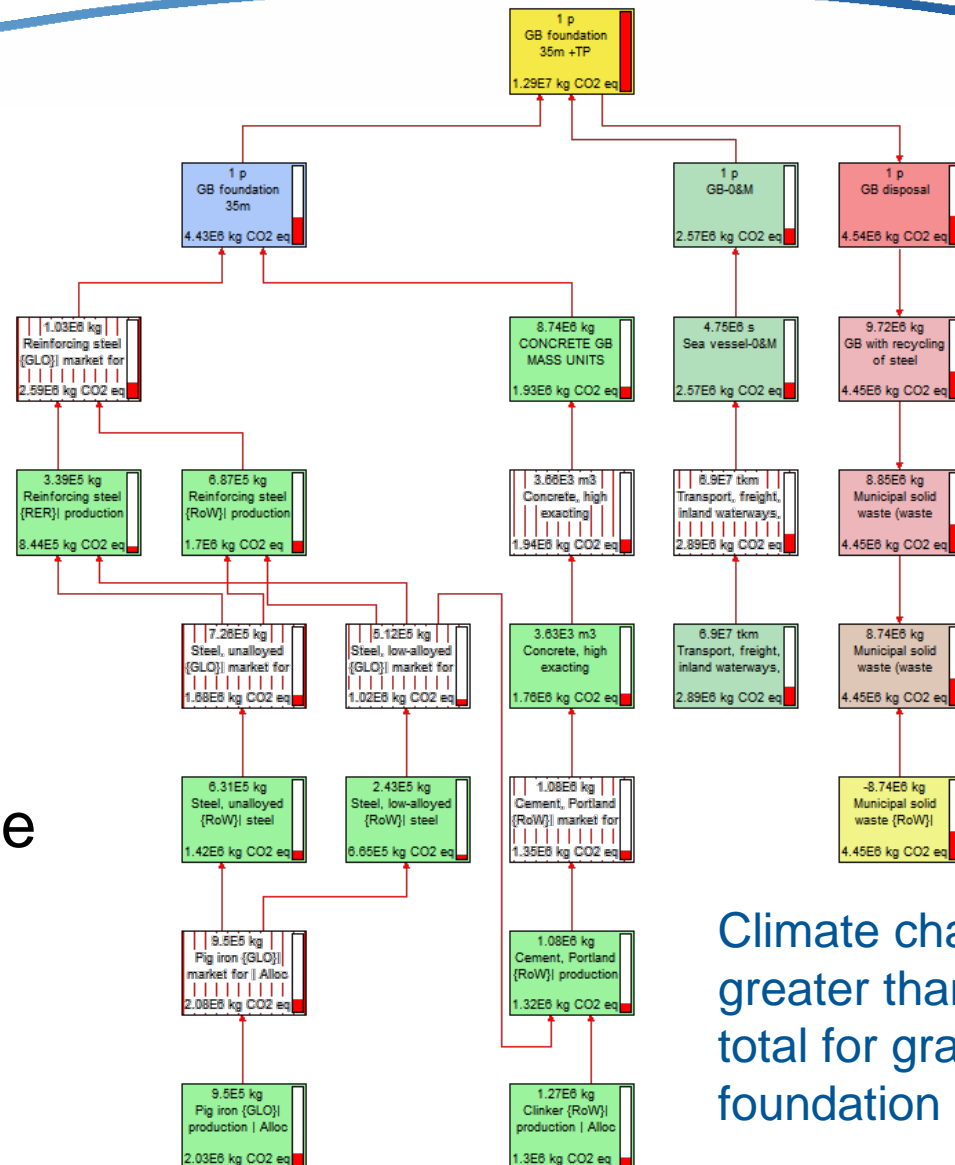
- 4 initial scenarios were selected
- Water depths are defined by available data for given foundations
- Analysis includes entire support system (foundation, transition piece and scour protection)
- Assume 8MW offshore turbine (Vestas V164-8) – impacts of turbine are NOT included

Full life cycle

- Materials & Manufacture
 - Mass-based analysis
 - Welding, rolling etc.
- Installation
 - Sea vessels
 - Preparation of sea bed
- Operations & Maintenance
 - Mostly by sea vessel
- Decommissioning & Disposal
 - Similar to installation
 - Recycling credit not considered

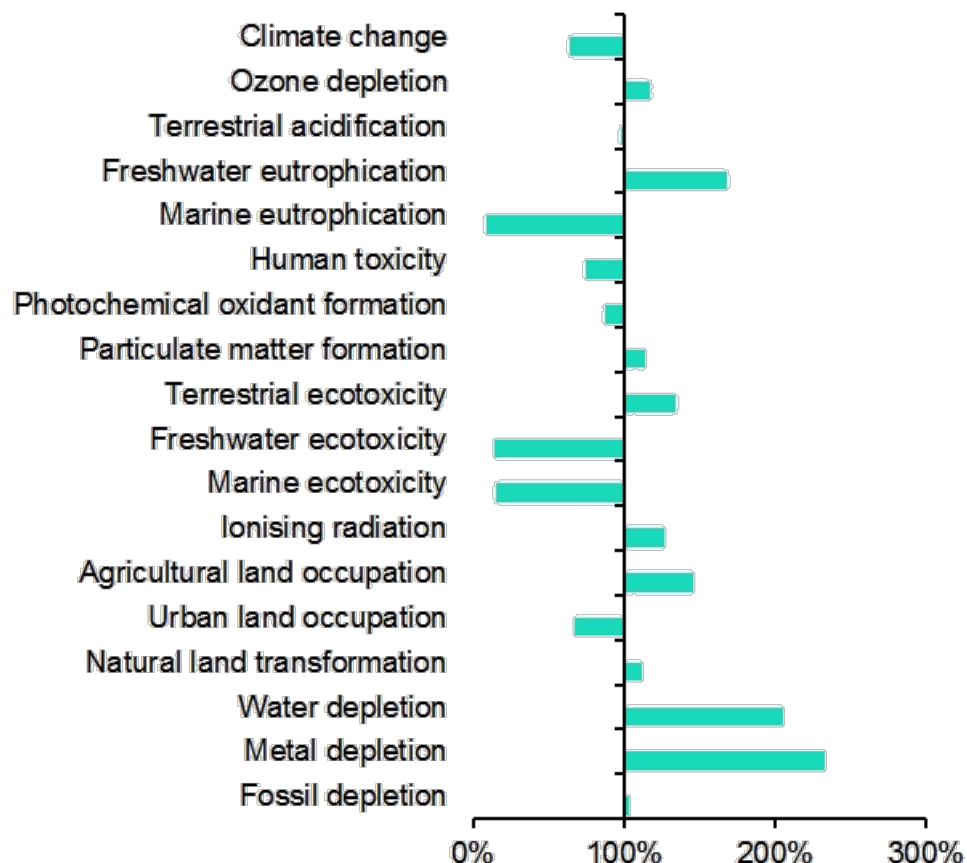


- SimaPro v8
- Ecoinvent database
- ReCiPe Midpoint LCIA method



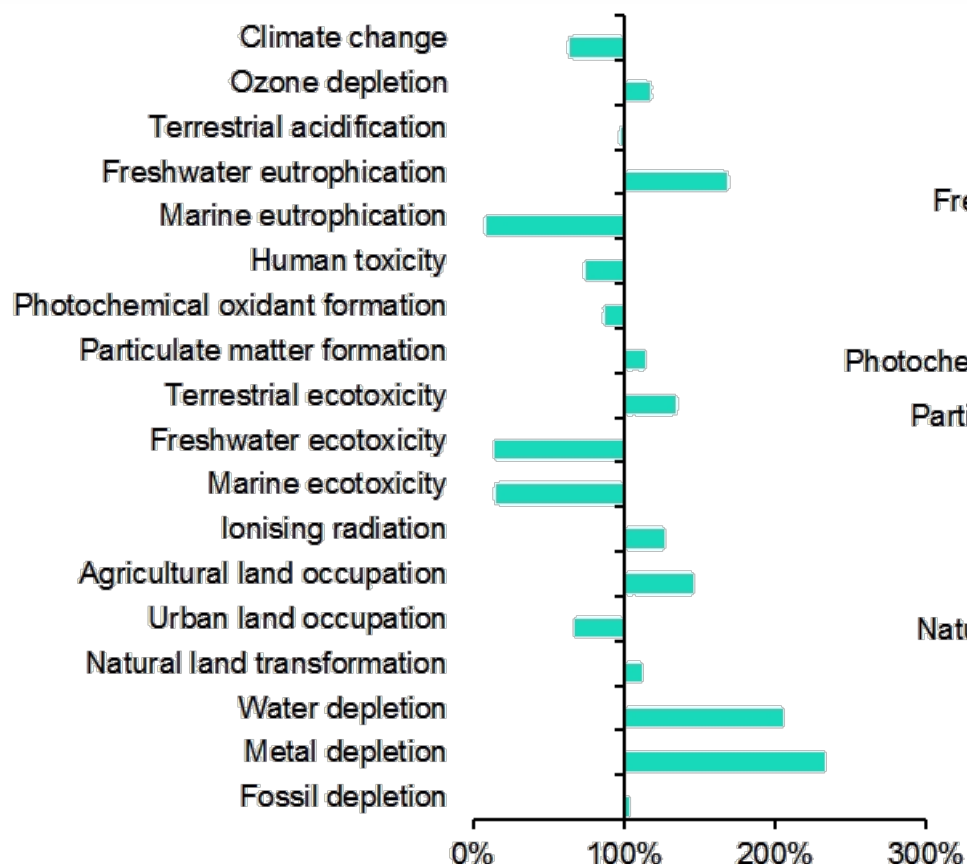
Climate change impact
greater than 5% of the
total for gravity base
foundation

Site 1 Results

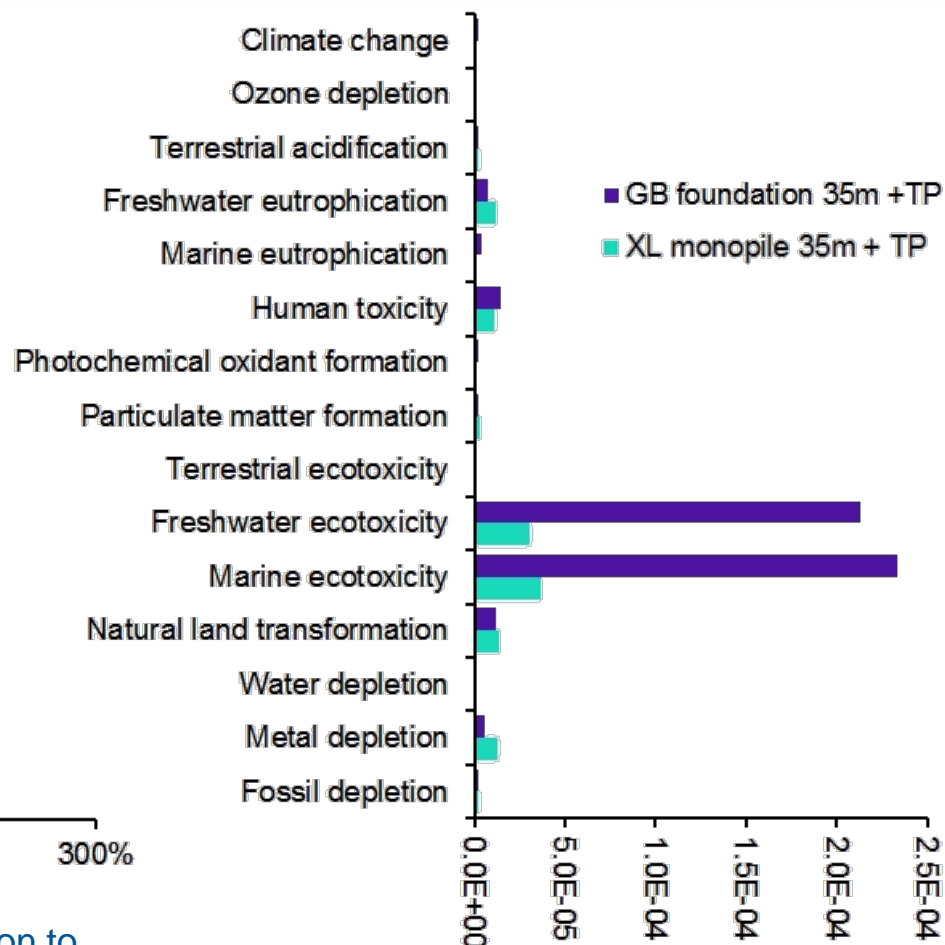


Performance of XL monopile in comparison to gravity base across all categories

Site 1 Results

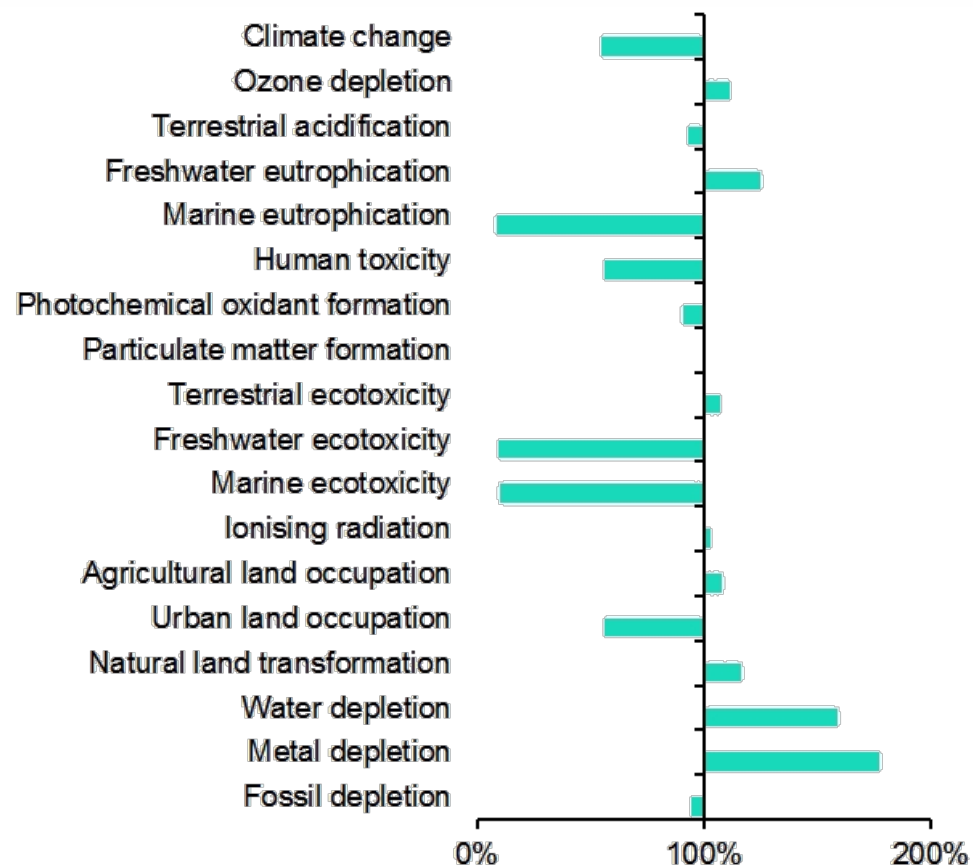


Performance of XL monopile in comparison to gravity base across all categories



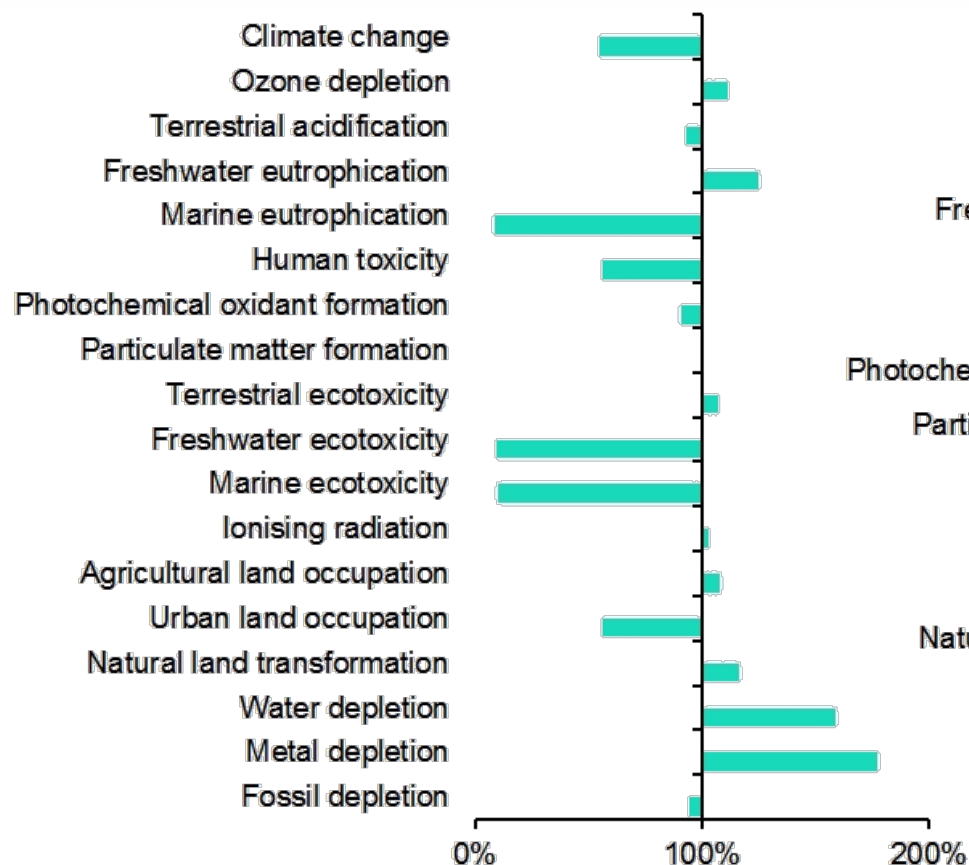
Normalised comparison

Site 2 Results

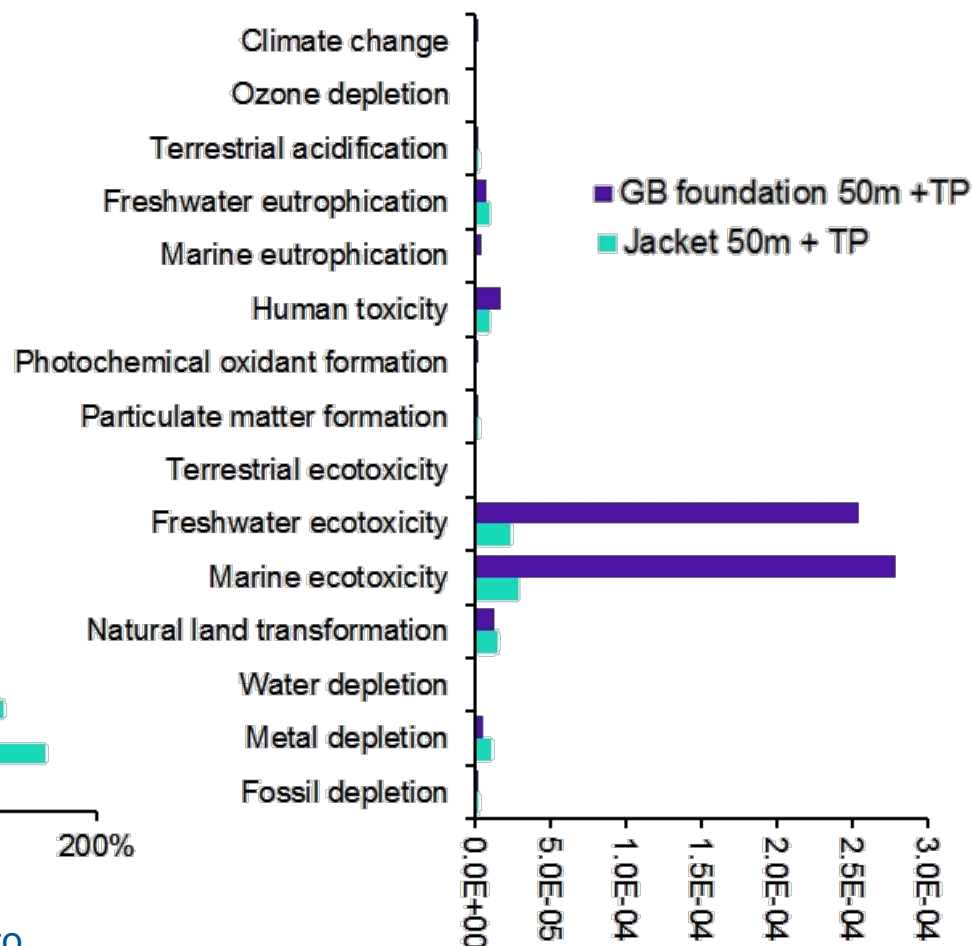


Performance of jacket in comparison to gravity base across all categories

Site 2 Results



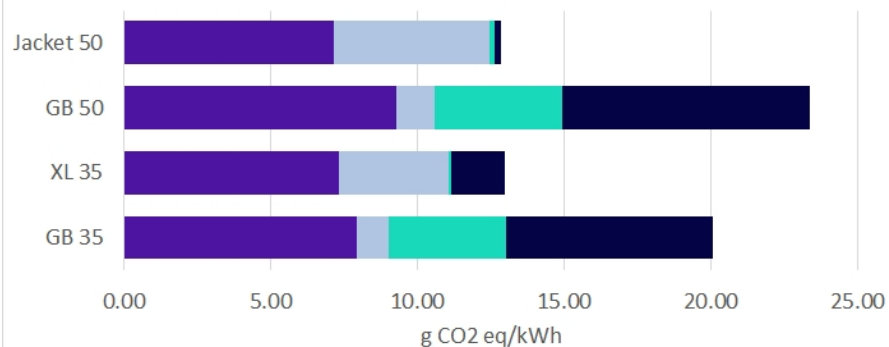
Performance of jacket in comparison to gravity base across all categories



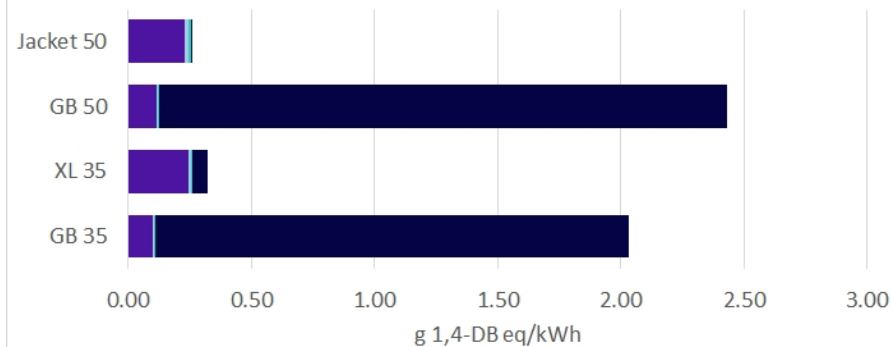
Normalised comparison

Selected Impact Categories

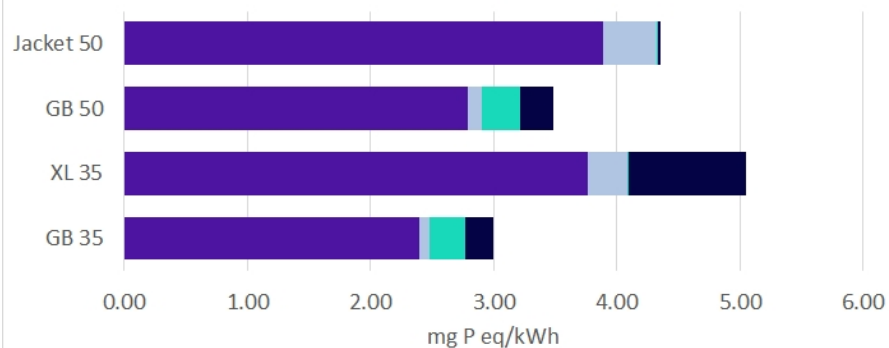
Climate change



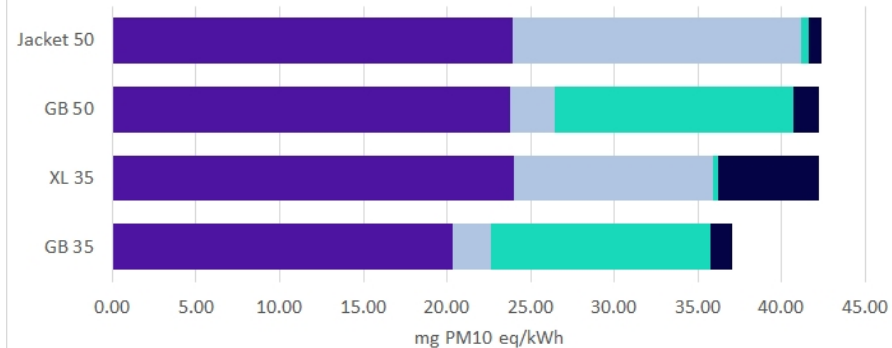
Marine ecotoxicity



Freshwater eutrophication



Particulate matter formation



■ Materials and Manufacturing ■ Assembly & Installation
■ Operation & Maintenance ■ Decommissioning & Disposal

- Steel foundations (XL monopile and Jacket) perform better than gravity base foundations in most categories.
- Further investigation is required to identify the significant impacts of gravity base foundations at disposal stage.
- These results are not necessarily based on the foundation designs being considered in LEANWIND – more definitive conclusions will be possible when input data is refined.



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leanwind

**Thank you very much
for your attention**